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Science News-Letter

The Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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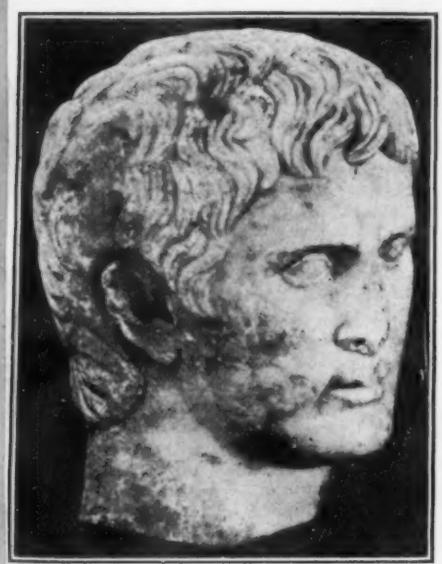
ARCHÆOLOGY

City Visited by St. Paul Unearthed by Scientists



Not a prize fighter, but a battered head of the Emperor Augustus found in Antioch.

By Emily C. Davis

Antioch, the city most often remembered as the place where the Apostle Paul turned from the Jews to offer his message of Christianity to the Gentiles, has acquired a new fame.

Archæologists who have excavated among the ruins of this ancient Roman colony have been studying the fragments of sculpture and architecture unearthed there, and these finds are declared to be outstandingly fine examples of the art of their time.

This means distinction of a high order, since the rivalry among Roman colonies was keen, and each city was eager to outshine the others, and if possible Rome itself, in the magnificence of its temples and monuments.

It should be said at the start that this Antioch which is winning the admiration of archæologists after it has lain buried for so many centuries is not to be confused with the Syrian Antioch where the Apostle Paul also preached, and where the name of Christian was first bestowed upon his converts. This ruined city is the Antioch of the province of Pisidia, high among the mountains of Asia Minor.

It was to Pisidian Antioch that Paul came about the year 46 A. D., when the city was a busy center of Roman civil and military administration. His preaching at the Jewish synagogue so attracted the entire population that "when the Jews were gone out of the synagogue, the Gentiles besought that these words might be preached to them the next Sabbath."

The account in the Book of Acts continues to say that on the next Sabbath almost the whole city gathered to hear him and that when the Jews saw the multitudes they were envious of Paul's popularity and condemned his preaching. Whereupon Paul and his companion Barnabas made a decision of policy that was so important in the history of the early church, saying boldly:

"It was necessary that the word of God should first have been spoken to you but seeing ye put it from you, and judge yourselves unworthy of everlasting life, lo, we turn to the Gentiles.

"And the word of the Lord was published throughout all the region."

Paul departed from the city, but Antioch's interest in his teachings grew for several centuries. The recent excavations have revealed the foundations of two large churches, one a cathedral, probably the first cathedral of the early church.

The city's destruction is believed to have been caused by the Arabs, about 713, though earthquakes have played a part in shaking down the walls and columns. As far back as 1833, the modern career of Antioch began when a British clergyman who was hunting for the ancient cities connected with church history found his way to the ruins and identified them as the true site of Pisidian Antioch.

The handsome features of Augustus restored.

Eighty years elapsed, and then Sir William Ramsay conducted trial excavations there and found that valuable relics lay only a few feet below the surface. The war interrupted his work, until 1924, when the University of Michigan became interested in Antioch and sent an expedition there in cooperation with him, under the direction of Dr. David M. Robinson, of Johns Hopkins University.

The full report of the important finds which have been made by this expedition has not yet been published, because scientists of the expedition are still studying several thousand photographs and exhaustive notes which they brought back.

The difficulty of reconstructing

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Antioch Unearthed

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the city and its life is particularly great. Not only was the entire area completely wrecked, but natives of the modern city nearby are accustomed to use the ruins of Antioch as a source of building materials.

Dr. Francis W. Kelsey, of the University of Michigan, director of the Near East Research of the University, states that "with rare exceptions, there remain exposed to view on the hill only blocks of limestone of such size and hardness that the natives have not been tempted to break them up.

"How many ruins still lie under the surface it is difficult to estimate; for in a number of places the natives in quest of building materials have dug down into a ruin and quarried it. Architectural fragments and inscriptions, and occasional pieces of sculpture are seen in the walls of houses and public fountains, and even in the cemeteries."

In spite of this wholesale removal of the city's stones, the expedition was able to trace foundations of the important buildings, and to find enough stones and carvings for the architect of the staff to draw detailed reconstructions, showing how the city's finest edifices looked in Antioch's prime.

In the area that has been uncovered they have found sculpture which members of the party pronounce finer than similar art in Rome itself.

"The temple area contains specimens of the best Roman sculpture known," is the opinion of Dr. Robinson.

"I don't believe that a Roman built this temple, nor that a Roman could have built it," said Dr. Robinson in a recent interview. "I believe that the colonists must have engaged a Greek to build their temple, for it combines the Greek beauty and rhythm with the solidarity approved by the Roman. And as a bit of more specific evidence, the mason's marks about the building are in Greek."

This temple which was so beautiful was on a hill in the center of the city, Dr. Robinson explained. Below it was a public square, known as the Square of Tiberius, which was lined on either side with shops. From this square, a broad stone stairway led up to another open space known as the Square of

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STUDY HELPS FOR SCIENCE CLASSES

These articles will be found to be especially useful in class work

GENERAL SCIENCE

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BIOLOGY

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HYGIENE

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PHYSICS

Un Homme De Genie,* p. 115. Anti-freeze Mixtures for Radiators,* p. 121. Americans to See Eclipse,* p. 123.

(This will fit on a 3 x 5 card.)

Science News-Letter, November 20, 1926

News-Letter Features

Born over four years ago, on March 13, 1922, of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the SCIENCE NEWS-LETTER has since proved interesting to laymen, scientists, students, teachers and children.

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Photographs aid in the telling of the week's science.

Science News-Letter, November 20, 1926

A new company in Canada is to make paper from waste straw.

Baltimore has the densest population of any city in the United States.

Dyed silks, both unweighted and tin-weighted, deteriorate if exposed to the sun.

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ROADS

Wider Roads, More Speed

The old wheeze that a chicken crosses the road because it can't go under it, will meet with stinging rebuke from the judge within twenty years, at least as applied to the human variety, if the hands of collective America remain on the steering wheel. This is the belief of W. C. Markham, executive secretary of the American Association of State Highway Officials, who believes that the increasing congestion on the highways of the country will force some innovations in highway engineering, among them being cross-overs and cross-unders at intersecting points on all important highways and boulevards.

As a prerequisite for concerted action Mr. Markham's organization has the united backing of every state in the Union. Uniform road signs and danger signals have already been officially adopted unanimously for use in every state, and roadside signs such as "Stop—Eat Here" have been outlawed as being inimical to the welfare of the majority.

Roadways 120 feet wide, well lighted at night by electricity or possibly by some method yet to be applied, such as radioactive substance, will, if present trends continue, be policed throughout their entire lengths by "stop" and "go" lights. Instead of speed limits of forty miles per hours it is predicted that all motorists will be required to maintain some minimum figure, such as twenty-five miles per hour; and, failing to do so, they may be arrested for obstructing traffic. A pedestrian who risks his own life and the peace of mind of drivers by crossing opposing traffic may be subject to a sentence in jail if he escapes the morgue.

As partial evidence to support these predictions, it was pointed out that during the past ten years much improvement has become evident in road conditions, and especially in the last few months. The Lincoln highway in Pennsylvania and Indiana is being widened to forty feet; entering Philadelphia the width is fifty-five feet. The Boston post road is being widened to thirty-six feet. Wisconsin and Illinois are building several four-lane pavements, each twenty foot strip being kept within its bounds, preventing cutting-in either from opposing or accompanying traffic.

Science News-Letter, November 20, 1926

PHYSICS

ROBERT WILLIAMS WOOD

Un Homme De Génie

In Dr. Wood one finds the happy combination of scientific ability coupled with remarkable inventiveness and ingenuity, the whole permeated with an intense love of fun. This has made him perhaps the leader of experimental physicists, but it has also found its outlet in another way, which is evident if one compares two of his best known books. One is his "Physical Optics"—a standard treatise on the subject; the other,—"How to Tell the Birds from the Flowers, and Other Wood-Cuts," where, with the aid of his own inimitable drawings, he tells us, for instance, how we may distinguish between the pecan and toucan:

"Very few can
Tell the Toucan
From the Pecan—
Here's a new plan:
To take the Toucan from the tree,
Requires im-mense a-gil-i-tee,
While anyone can pick with ease
The Pecans from the Pecan trees.
It's such an easy thing to do,
That even the Toucan, he can too."

Dr. Wood was born at Concord, Mass., on May 2, 1868. After graduating from Harvard, he studied at Johns Hopkins, Chicago and Berlin, returning to his Baltimore *alma mater* in 1898, where he has been professor of experimental physics since 1901. During the War, as a major in the Signal Officers' Reserve Corps, he aided in scientific work in France.

Science News-Letter, November 20, 1926

FORESTRY—AERONAUTICS

Reforesting By Airplane

New practical uses for airplanes appear on the horizon every day. This time a plane has been pressed into service to help reforest a burned over area of several hundred acres in a forest reserve near Honolulu, Hawaii.

About 700 pounds of forest tree seeds were sowed by airplane in less than an hour over rocky, inaccessible country devastated by recent forest fires that would have required an immense amount of time and labor if done by hand, according to reports from the forestry section of the Territory of Hawaii.

The aerial sowing was of value in getting the burned over area seeded quickly so the young seedlings would have a start ahead of the undesirable weeds and ferns that spring up nearly over night in the tropics.

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METALLURGY

Oil Smelted Copper

The most ancient copper used by man early in the dawn of civilization may have been smelted by the heat of petroleum, one of the most modern of fuels. This is the novel theory advanced by Percy E. Speilmann in a communication to the British scientific journal, *Nature*.

It was nature, rather than man himself, who arranged the smelting. Sir Flinders Petrie, the Egyptian archæologist, recently discovered a remarkable similarity between the description of the Egyptian Paradise described in the "Book of the Dead" and a region along the rivers of the Iora and Kura in the Caucasus. This is supposed to have been the original home of the Egyptians where they learned the working of metals, agriculture, and the writing of language.

In this area petroleum seepages, forming lakes in some cases, exist in close proximity to copper ore, and the theory is that the oil, accidentally fired, smelted the ore so that man coming upon the copper at a later date found it in metallic form.

The most widely accepted theory of the first smelting of copper is that primitive man accidentally brought ore and fuel together in his family campfire, thus becoming an accidental metallurgist.

Science News-Letter, November 20, 1926

The snowshoe rabbit changes its coat from brown to white in winter.

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Make the Punishment Fit the Crime

Prof. Murchison, of Clark University, has investigated the crime situation from an unusual angle, and his findings are distinctly different from those of most present day criminologists. In the following article, he outlines the weaknesses of the American system of dealing with crime, as he has found them from his study of men in ten penitentiaries. He recommends drastic remedies.

By Carl Murchison

During recent years the idea has become more and more fixed in the minds of those who deal with criminals that it is in some way unethical to punish severely those criminals who are young, or feeble-minded, or insane. They are convinced that it is a sign of great cultural development for the State to use the indeterminate sentence in dealing with offenders. As the crime wave attains more and more fearful proportions, there are many who become agitated with fear that the idea is not being applied generously enough. So indifference to law flourishes in the matrix of this fallacy or maternalism.

Is there any reason why young criminals of college age should not receive the death penalty for murder, or a long sentence in the penitentiary for robbery? Approximately one-fourth of all criminals are of this age. Intelligence, as tested by mental tests, does not increase after this age. The average individual has completed his formal education even before this age. The influence of the home has already passed its maximum. The influence of religion has begun to wane. All the methods of love have been tried for all the years of his young life, and have failed. What earthly logic or sense is there for assuming that such an individual is too young to hang or to be sent to prison? All the facts are against the validity of such an assumption. The maternalistic methods having failed already, the logical procedure is swift, sure, and severe punishment.

This maternalism is frequently the result of a distorted and misinterpreted philosophy of determinism. How frequently we hear the plea that a young criminal has never had a chance, that he has been a victim of circumstances, that his behavior has been determined by his environment. Such a philosophy, though valid in science, is sheer nonsense in the province of social control when applied only to the individual offender and not also to the community which contains him. If it has been determined by circumstances that an individual commits crime, let it also be determined by circumstances that a social community will strike back with sure and swift punishment. It is quite likely that such circumstances will alter many cases that now clutter our criminal dockets.

This maternalism is also frequently stimulated by unfounded claims made concerning the health condition of the criminal. It is frequently asserted that criminals are sick men. Such assertions appeal to the sympathies of the members of the community. There could be no objection to criminals being classed as sick men, if such claims were not used as bases for reducing guilt and punishment. Logically, punishment should be all the swifter before the sickness spreads.

One of the most pernicious claims of recent years is that criminals of low intelligence should not be punished as severely as others. The reason given is that these people do not have intelligence enough to know any better. That is all the more reason for swift and sure punishment, since such methods alone are capable of being understood by such people. The entire removal from society of such people certainly cannot be criticized on the basis of any principle of social welfare. A maternalistic attitude towards feeble minded criminals can be defended only in the light of principles that involve the welfare of the feeble-minded alone, and by definition the feeble-minded can never understand such principles. It would be just as useful to formulate such principles for the protection of flies, mosquitoes, snakes and disease germs.

But the great and crowning glory in the practice of criminal law is the protection offered to the insane, and the methods made available for facilitating proof of insanity. If a criminal is insane, that is all the more reason for extinguishing him from society. He can never be of any service to the State or to himself.

Practically all the literature of the last fifty years in the fields of criminology and penology has fostered the development of this maternalistic fallacy. It is time to call attention to the fact that criminal data do not support the fallacy.

The writer has gathered data from mental examinations of ap-

(*Just Turn the Page*)

Finds Goats in Trees

Goats calmly pasturing in the treetops, and grapevines grown at the bottom of deep holes in the ground, were two of the strange sights seen during a botanical tour in Africa and Asia by Dr. David Fairchild, agricultural explorer of the U. S. Department of Agriculture, who has just returned to Washington. The "monkey-shining" goats he found in Morocco, not far from the scenes of Abd-el-Krim's recent war, and the entrenched vineyards, were on one of the Canary Islands, off the coast of Africa.

A considerable tract in southern Morocco, Dr. Fairchild explained, is dominated by forests of a tree genus not found anywhere else in the world, though it is related to the sapodilla tree from which chewing gum is obtained. The trees are of a gnarled and crabbed growth habit, and their tops are matted together. The ground under them is barren, so that the only pasturage for the natives' goat herds is to be found on their branches. The goats therefore have learned to climb up into the trees, where they have regular paths and runways among the branches. Here they thrive on the leaves and the yellow plum-like fruits.

During a part of his explorations in Morocco, Dr. Fairchild was permitted to go botanizing only under armed guard, though he states that he never saw or heard the least sign of hostility from the natives, and believes that he was safer in the supposedly hostile territory than he is from being run over by a truck in the streets of Washington.

The entrenched vineyards he found growing in exceedingly arid volcanic soil on one of the Canary Islands, where no rain whatever had fallen in two years. There is constant cloudiness, however, and every night heavy dews are deposited. The people who live in this black and forbidding waste find that they can grow excellent grapes by sheltering the vines in pits six feet deep. They also grow crops of corn with stalks only two feet high, reminding one somewhat of the corn of the Navajos and other tribes of our own Southwest.

Science News-Letter, November 20, 1926

Wax can now be made synthetically.

Cellulose acetate is employed on airplane wings to make them transparent, waterproof, and non-inflammable.

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Punishment to Fit Crime

(*Continued from Page* 117)

proximately 7,000 criminals in ten of the largest penitentiaries and reformatories in the United States. From such data the following are among the significant facts discovered:

Intelligence is just as serious a problem for criminology as is feeble-mindedness. According to the same mental test given American soldiers, the criminal group seems superior to the white draft group. Not only is this true of a general comparison, but it is true if we make the comparison in separate units according to the states from which the draft quotas and criminal groups were drawn. Repeaters seem more intelligent than first offenders, in so far as differences exist.

The criminal is much less literate than was the American Army. However, the migratory criminals are much more literate than are home-grown ones.

The criminal group is relatively youthful. But the fraud group, which is the most intelligent group, is the oldest. The force group is composed of extremely young men. Statutory crimes are committed chiefly by young men, while crimes of physical violence are committed chiefly by older men. Sex crimes are chiefly committed by mature men.

Recidivists are not older than are first offenders. In some type-groups the recidivists are even younger than are the first offenders. But, on the whole, the difference between the recidivist and the first offender is a difference that can scarcely be expressed in terms of time.

In prison we find more intelligent accountants, musicians, mechanics, machinists, tailors, barbers, cooks, engineers, and telegraphers than could be found in the Army—speaking in terms of percentage.

The criminal is religious, the vast majority belonging to some established denomination. The religious denominations vary widely in intelligence, the Hebrews and the agnostics seeming to be more intelligent than are the Catholics and the Protestants. But the agnostics rank very low in literacy. The Presbyterians and the Episcopalians are much more literate than are the Hebrews.

There is no indication at all that intelligence is injured by length of incarceration.

The idea of treating offenders more leniently has gained wider favor as the number of crimes and criminals has increased, at least here in America. Meanwhile, practical and effective methods for removing criminals from our midst are well known and at hand. They are:

1. The abolition of the jury system. 2. Uniform punishment for the insane, the feeble-minded, and the young. 3. The abolition of the system of release on bond. 4. The abolition of the indeterminate sentence. 5. The abolition of the parole system. 6. The application of the deterministic philosophy to the behavior of the State as well as to the behavior of the criminal. 7. The third penitentiary conviction to carry an automatic death penalty.

Science News-Letter, November 20, 1926

No planet lacking air, water, and a reasonable degree of heat could support life.

In the warmer sections of California, the number of bats is said to be equal to the number of insect-eating birds.

The nesting place of the rare surf bird has been located in Mt. McKinley National Park, in Alaska, by two California scientists.

Smoke from domestic fires sends five times as much soot into the air in England as fires in industrial plants, says a British scientist.

Men of the late Stone and Bronze Ages spent so much time in a squatting position that their leg bones became flattened in a typical manner.

Death Valley, California, 270 feet below sea level, can look off to snow-capped Mt. Whitney, 80 miles away, with an altitude of 14,500 feet.

A motorless glider with two passengers recently stayed in the air nine hours, 21 minutes, in East Prussia, nearly doubling the former record.

The history of 40,000 individual corn plants has been recorded at Ohio State University, in an attempt to perfect a corn that will resist the corn borer.

A cave in the Pyrenees Mountains was visited for 200 years before the remarkable paintings made on the walls by prehistoric cave dwellers were found.

Looking down from the ruins of Antioch toward the modern city, which has many historic stones from old Antioch built into its shops and homes.

Antioch Unearthed

(*Continued from Page* 114)

Augustus. And here, set against a semi-circle of the native rock, stood the temple.

This religious center of the city proved a hiding place for a variety of valuable relics. When the expedition began to clear away the earth and piles of broken stones they discovered in the Square of Tiberius a stone circle six feet in diameter set in the paving. Holes in the circle had once been fitted with metal letters to spell out the inscription that a certain Roman aedile, or magistrate, had presented the pavement of the square to the city.

The stairway between the lower and higher squares was decorated at the top landing by three great arches elaborately carved, in the form of a memorial to the Emperor Augustus. Two powerful looking Pisidian chiefs with their hands bound are carved over the arch in token of Augustus' conquest. His victories on land are shown by a frieze of shields, breastplates, and other weapons, and his naval triumphs are represented by a frieze of ships, tritons, dolphins, and other marine symbols, with Poseidon himself, god of the sea, among them.

The temple in the upper square remains somewhat mysterious, as no inscription has yet been found stating in whose honor it was built. Study of fragments of the sculptures leads Dr. Robinson to believe that it may have been a shrine dedicated both to the Emperor Augustus and to the local god of fertility, known as Men.

"Enough parts of the temple have been found so that it could be rebuilt," says Dr. Robinson, "though there is small chance of the Turkish government carrying out such a project. The architect of the expedition spent many days examining the architectural units that were identified. From these he has been able to draw a very accurate reconstruction, even to the elaborately carved figure that crowned the pointed roof of the edifice."

Besides the temple, other traces of Augustus' influence on the city have been found by the excavators. One of the objects unearthed was a marble head which had been buried in a Byzantine house. The nose and mouth had been battered and there was no sign of any other part of the statue. But when a restoration of the nose and other features was made on a plaster cast of the head, the fine profile of the handsome Augustus was revealed.

After careful examination of the head, Dr. Robinson has concluded that it is an idealized portrait of the Roman emperor made by a sculptor who had never seen his royal subject.

"The head conforms so strictly to the Augustus type, and yet it is so academic and generalized," he says, "that it is safe to apply to it the explanation that waxen or clay portraits of Augustus were sent to the provinces to be copied by local artists who had never seen Augustus himself."

He believes that the statue was set up late in Augustus' lifetime,

(*Just Turn the Page*)

Ultra-Minute Germs Studied

A brief glimpse into a new world, more minute than that revealed by the most powerful microscopes, was given scientists at the Philadelphia meeting of the National Academy of Sciences. Dr. Simon Flexner, director of the Rockefeller Institute for Medical Research of New York, described researches that are in progress upon one of the world's mystery diseases, encephalitis lethargica, popularly known as sleeping sickness.

There is a realm of invisible organisms living within the animal body. Against these deadly submicroscopic germs, called "viruses," the medical world has no safeguard, Dr. Flexner explained. The bacteriologist can not grow them, his eyes can not see them, he can distinguish them only by their effects. Many of the most troublesome diseases, such as encephalitis and the hoof and mouth disease of cattle are caused by these viruses.

In studying encephalitis, which suddenly appeared in the world in 1916 in Europe and which since 1919 has been epidemic in this country, medical researchers believed that they had found evidence that the virus of this deadly disease was the same as that obtained from ordinary cold sores such as have afflicted the lips of the human race since a remote past. The contents of these cold sores when injected into rabbits produced a diseased condition quite similar to that of human encephalitis. But further research, particularly that of the Rockefeller Institute, failed to substantiate the identity of the two viruses and Dr. Flexner told the academy that the cause of encephalitis is still an unsolved problem. Two years ago Japan suffered from a severe epidemic of a new disease similar in character to the encephalitis of this country and Japanese investigators may throw some light on the problem. Seven out of ten people afflicted in Japan died and the disease has a high fatality rate in this country as well.

The eye of the camera, which can see with light too short to be caught by the human eye, will be used in investigating the invisible viruses, Dr. Flexner explained. By taking photographs through the ultra-microscope which utilizes ultra-violet rays, and perhaps even using the very short X-rays themselves, it may be possible to picture the guilty germs at present invisible.

Science News-Letter, November 20, 1926

Edison was 30 years old when he invented the incandescent light.

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Antioch Unearthed

(*Continued from Page* 119)

probably at the time the temple was erected. As there is no trace of a rayed crown or any other sign of deification about the carving, the likelihood is that the Emperor was still living when this statue of him was set up in the distant Roman colony.

Another important Augustan relic is the res gestae, or deeds, of the famous emperor, which were carved on four massive blocks of stone and were placed on the steps leading up to the Square of Augustus.

The temple area also yielded an inscription of a different kind, the earliest known warning to food profiteers in existence. This long Latin inscription carved on a stone tablet had been posted in the public square during the serious famine which took place about 93 A. D. But it was found in a Byzantine home built several centuries later on the edge of the square. The food edict had been used by the builder as an ordinary stone in the wall of the house.

The edict, which is in a good state of preservation, has been translated and analyzed by Dr. Robinson, who says:

"The local authorities of Antioch seem in ancient days to have been unable to cope with the famine situation. This had led to hoarding of grain in the hope of later securing higher prices, and an appeal was made to the governor on behalf of the people to compel the speculators and producers to sell. The governor answered their petition with an official edict for their city.

"The edict ordered each person to declare before the officials how much grain he had, and how much he was deducting for his household and for seed. The rest he was ordered to offer for sale, and if he evaded the order, the surplus grain that he boarded was to be confiscated.

"An outstanding fact about this ancient food edict is that it forbade any one to make over 100 per cent. profit, whereas in our own times, 400 and 500 per cent. profit was not unknown in the recent war."

From the temple of Augustus the expedition went down near the city wall to study the foundations of Christian churches. The city was at the height of its Roman pomp when the Apostle Paul visited it. But where he went to preach in the Jewish synagogue is unknown. Such buildings were unpretentious, often being of wood, and no trace of a synagogue has been discovered.

Two churches have been found, one on the hill, the other, a basilica, in the lower city; and the possibility has been suggested that this basilica might have been built on the spot where Paul taught his Greek speaking converts.

"On account of the hostility of the Jews, the earliest Christian congregation could hardly have had the use of any public building or place for its meetings," Dr. Kelsey explains. "Probably at the beginning, gatherings were held in the ample court of some private house, the home of a wealthy believer, in a secluded part of the city. If this was true, it may well be that the house in which the apostles preached was replaced by a church, and that this church, as the congregation increased, was replaced by the splendid edifice, and that, finally, the later basilica was built on a slightly higher level, on ground consecrated by the preceding centuries of Christian worship.

The later church, nearest to the surface had been bereft of its columns and architectural pieces when the scientists found it. But they cleared away the earth, revealing the plan of a building 200 feet long, with a few broken shafts of columns

The possibility of something hidden deeper remained, and when workmen had dug only two feet below the floor, they discovered the floor of an older church, possibly the earliest Christian cathedral ever built.

The excavation of Antioch represents a strictly twentieth century viewpoint of archæology. When scientists began to go out to remote regions with pickaxes and shovels and dog tents, they went hoping to bring back rare specimens to enrich their collections, as well as to learn more about lost civilizations. But in the past few years, the countries that happen to own ancient ruins have begun to look with disfavor upon collectors, either professional or amateur; so that now practically all scientific digging is conducted with a purely detached and academic interest.

All sculptures and fragments of inscriptions found at Antioch must be turned over to the Turkish government, and some are already reposing in the local museums. To the scientists goes the honor of discovery and the chance to add to the store of definite knowledge of the ancient world.

MOTOR VEHICLES

Anti-freeze Mixtures for Radiators

Now that the temperature is likely to drop below the freezing point, automobile radiators must be protected by filling them with some solution that stays liquid when water has changed to ice.

What should be used? is a question that science can more easily answer this year than heretofore.

Denatured alcohol, or its poisonous brother, methanol (wood alcohol), will continue to be the usual and most common anti-freeze agent this year. Alcohol is cheap, effective and easily obtainable, but it has the disadvantage of evaporating and needing frequent replenishing.

Glycerine will also be a favorite. For all who drive cars painted with Duco or other cellulose lacquers, glycerine is practically a necessity for alcohol dissolves this new sort of finish and even a small amount of alcohol radiator solution spilled on the paint is likely to ruin it. Glycerine is more expensive than alcohol but it does not evaporate very readily and one filling of the radiator should last a whole winter season if the radiator is free from leaks. Either the colorless chemically pure glycerine or the yellow distilled commercial grade can be used with safety but the crude product is dangerous because it usually contains salts that corrode the radiator.

When placing either alcohol or glycerine in the radiator, do not fill it above two inches from the top of the overflow pipe since the solution will expand when the radiator warms up.

Denatured alcohol is preferable to wood alcohol in spite of the fact that 10 per cent. less wood alcohol is required for protection against freezing at any given temperature. Wood alcohol often contains free acids which will damage the radiator and its fumes due to its poisonous character may be harmful.

Mixtures of alcohol and glycerine are often used as a compromise between the cost of glycerine and the volatility of alcohol.

A little-known chemical, ethylene glycol, which like alcohol and glycerine is one of the chemical group of alcohols, is being heralded in chemical circles as an almost ideal radiator anti-freeze material. Except in northern cities, it is not yet available in the open market because the demand is large and the supply is small. This chemical is used in the manufacture of Duco and other lacquer automobile finishes and the available supply is largely utilized in this way. Glycol does not evaporate readily, it lowers the freezing point more effectively than alcohol, and it is non-corrosive. Its cost is about that of glycerine and when it is available in sufficient quantity it should be widely used.

Many other radiator solutions have been widely exploited and tested but all of them are objectionable for some reason.

Salts, like calcium chloride, magnesium chloride, common salt, etc.—All solutions of salts are corrosive and practically sure to cause serious damage to engine jacket or radiator. They are particularly harmful to aluminum and solder. Calcium chloride solutions are often troublesome if they come in contact with spark plugs and electrical connections as they cause short circuits. Both calcium and magnesuim chloride solutions have been widely sold under trade names.

Sugars, such as honey, invert sugar and glucose.—Although honey has been recommended as an anti-freeze agent, tests at the U. S. Bureau of Standards show that low percentage mixtures do not have sufficiently low freezing points and that high percentage mixtures are so viscous that they circulate very slowly, if at all. Invert sugar acts about like honey and glucose is of even less effect than honey.

Oil—Lubricating oil is used in some cooling systems on tractors. It is not suitable for use in ordinary automobiles for oil cooling systems must be especially designed to give more rapid circulation to compensate for the low heat capacity and the high viscosity of oil.

Kerosene—Kerosene can be used in automobile cooling systems provided with mechanical circulation but the odor and inflammability of its vapor, the possibility of overheating due to high boiling point, and its solvent action on rubber are objections to its use.

Right Proportions to Use

The list below, based upon Bureau of Standards tests, gives the proper amounts of the various safe anti-freeze chemicals that should be placed in radiator water to protect at the temperatures indicated.

	Percentage, by Volume, in Water			
Freezing Temperature F.	Denatured Alcohol	Wood Alcohol	Distilled Glycerine	Ethylene Glycol
20°	19	12	22	16
10°	30	20	32	25
0°	38	29	40	32
—10°	45	34	47	39
—20°	52	40	54	44

Example: If denatured alcohol is used, minimum temperature is 20 degrees and the radiator holds 3½ gallons, the radiator solution must contain 19 per cent alcohol, that is, about one-fifth of it by volume. Proper solution can be made by adding one-fifth of 3½ gallons, a little more than 5½ pints, of alcohol to 11 quarts of water.

Science News-Letter, November 20, 1926

MEDICINE

Rheumatism a Disease

Rheumatism is a distinct and well defined disease, though not responsible for all the aches and pains attributed to it, according to Dr. W. G. MacCallum of the department of pathology of the Johns Hopkins University.

By the great mass of people any pain or swelling in the joints or muscles is called rheumatism. Many believe that rheumatism is not a disease at all but merely the common name for certain symptoms which may arise from many different causes.

Arthritis, an infection of the joints causing pains and swelling, sometimes destroying parts of the joints and causing bony deformations, is a symptom of various diseases: scarlet fever, pneumonia, tuberculosis, cerebrospinal meningitis, dysentery, septicemia, etc., and is to be distinguished from rheumatism.

For many years, said Dr. MacCallum, it has been recognized that there is one condition in which painful swelling of the joints is variously combined with tonsilitis chorea, fever, subcutaneous nodules, and especially with profound disease of the heart, than stands apart from all the rest and is most commonly known as acute rheumatic fever or rheumatism.

The most serious danger of rheumatism lies in its attack upon the heart. The whole heart is involved. But certain parts seem to be especially affected. The tissues are altered. The walls thicken and the valves become distorted.

The peculiar thickening of the wall of the left auricle characteristic of many cases of rheumatism was first observed by Dr. MacCallum.

Science News-Letter, November 20, 1926

The horned toad is really a lizard.

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ASTRONOMY

Americans to See Eclipse

Dr. S. A. Mitchell, director of the Leander McCormick Observatory of the University of Virginia and veteran of six expeditions to observe total solar eclipses, will make his seventh eclipse trip next summer.

This expedition will be to Norway, where a total eclipse of the sun will be visible for half a minute early on the morning of June 29, 1927. It will also be visible in England, but there it will happen at about 5.30 a. m. and the chances for clear weather will not be as favorable as in Norway. The duration of totality will be shorter, but for the research in which Dr. Mitchell is particularly interested this is not a serious handicap, for he is confining his attention to photographs of the "flash spectrum." Ordinarily, the spectrum of sunlight, obtained by passing it through a combination of prisms and lenses, is a band of various colors, crossed by a series of dark lines. Just before and just after a total eclipse of the sun, however, the light reaching the observer comes from a thin outer layer of the sun's atmosphere, and then the flash spectrum, consisting of a series of colored bands against a dark background, can be seen.

The expedition will be financed by a gift from John Armstrong Chaloner. The scientific importance of making the observations of the flash spectrum arises from the fact that it supplements knowledge obtained from daily work on the sun at such great observatories as Mt. Wilson in California.

"The ordinary spectrum of the sun consists of light of the photosphere absorbed by the cooler layers of the sun's atmosphere," said Dr. Mitchell. "These cooler layers are hotter than any blast furnace on earth, and at the time of a total eclipse they may be photographed as the flash spectrum. One of the important features of the flash spectrum is that it makes known the height in miles or kilometers that each atom in the atmosphere of the sun extends up above the solar surface.

"As the result of solar investigations made at eclipses and at other times it is no exaggeration to state that we know vastly more of conditions in the solar atmosphere, though the sun is over ninety millions of miles away, than we know of the atmosphere of the earth in which we live and move and have our being."

So far as Dr. Mitchell knows, the McCormick-Chaloner expedition will be the only one from the United States to observe this eclipse. The short duration of totality makes it unfavorable for any study of the corona, which surrounds the sun, but is only visible at the time of a total eclipse; or for investigation of the bending of star-light when passing the sun, as predicated by the Einstein theory.

Science News-Letter, November 20, 1926

MEDICINE

Concerning Smallpox

I will go into the next severe epidemic with ten selected vaccinated persons and ten unvaccinated persons. I should prefer to choose the latter—three members of parliament, three anti-vaccination doctors, if they could be found, and four anti-vaccination propagandists. And I will make the promise—neither to jeer nor to jibe when they catch the disease, but to look after them as brothers, and for the four or five who are certain to die I will try to arrange the funerals with all the pomp and ceremony of an anti-vaccination demonstration.—*Sir William Osler.*

Science News-Letter, November 20, 1926

PALEONTOLOGY

First Fossil Collected

What is probably the first fossil to have been collected by man is in the possession of Barnum Brown, associate curator of fossil reptiles in the American Museum of Natural History. The priceless relic is an elephant's tooth dating back around 5,000,000 years and was picked up by Mr. Brown in the ruins of the Asklepieion, the medical school of ancient Greece, where Hippocrates, the father of medicine, carried on his studies.

Hippocrates was the first to introduce principles of inductive philosophy in the practice of medicine which had hitherto consisted of a system of superstitious rites practiced wholly by the priests. It is surmised that the great master may have handled and discussed the prehistoric molar himself for it was found covered with fragments of statuary and figurines in one of the larger buildings of the ancient school.

Two sites for fossil remains of elephants exist several miles from the Asklepieion so it is evident that the tooth was carried there at least 2000 years ago since Hippocrates was born around 460 B. C. and his famous school was in ruins by the beginning of the Christian era.

Science News-Letter, November 20, 1926

BIOLOGY

NATURE RAMBLINGS

By FRANK THONE

Our National Bird

Why the turkey should have been named for one of the Old World countries, and not the nicest one at that, will probably always remain a puzzle. There is no bird so thoroughly, even so exclusively American. He was unknown to civilization before the voyages of Columbus, and Turkey was one of the last countries in Europe to have the privilege of making his acquaintance. Perhaps the amount of red about the bird's head, with the pendulous wattle hanging down one side, suggested the Greek fez which the Turk had adopted as his national headgear.

When the American republic was young, there was much discussion over a suitable bird or animal to emblazon in our heraldry. The selection of the white-headed or bald eagle was much opposed by our most famous ornithologist, Audubon, and by one of our foremost forefathers, Benjaman Franklin. Each in his turn made it plain that the bald eagle is not an especially noble bird. Certainly not a bird of prey, for his favorite diet is fish, and even these he usually obtains by robbing the fish-hawk of the latter's honestly acquired booty. And both Franklin and Audubon insisted that the proper bird for our coins and Great Seals and coats of arms was the turkey: a beautiful, cleanly, courageous bird, living virtuously according to the conscience of a turkey, at least—and not invading his neighbor's rights.

Though other counsels prevailed, there is at least one day in the year—and that the most truly American holiday—on which the eagle must forbear his screaming to make way for the gobbling of the turkey.

Science News-Letter, November 20, 1926

Wheat and barley were cultivated by prehistoric farmers of the Stone Age.

Records of children suffering from rickets show that the disease is practically limited to the North Temperate zone.

Past Volumes

Nine volumes of the SCIENCE NEWS-LETTER have been issued in mimeographed form. Volume I consisted of numbers 50 to 90, inclusive, including the period March 13 to December 30, 1922; thereafter volumes consisted of 26 numbers covering half-year periods, with the exception of Volume IX which consisted of numbers 273 to 285, inclusive, and included the three-month period of July, August and September of this year. Volume X began with No. 286, the first to be printed, and will cover only the three last months of this year. Thereafter volumes will cover half-year periods. The pages in each volume will be numbered consecutively.

Science News-Letter, November 20, 1926

Fishes may revive after being frozen two or three months.

Use of pine shavings as "snow" in moving picture productions is being tried out.

Surveyors' tapes are made of a nickel steel called invar, which does not expand or contract with changes in temperature.

Leopard skin once defied imitation, but skilful furriers can now stencil the leopard's spots on sheared goat skin.

Since 1901, the proportion of plantation rubber used in this country has increased from nothing to 93 per cent.

A small tiara of little gold beads, worn by a woman 6,000 years ago, is one of the old Egyptian finds made at Abydos.

The Chemical Warfare Service is studying the teredo and other marine borers which recently appeared in Pacific waters.

The eyes are more abused than any other organ, because there is usually no pain to warn an individual of injury to vision.

Pulp left over in making sisal fiber contains enough fermentable sugar to yield about five gallons of alcohol per ton of leaves.

To protect old autographs and writings on the rock known as El Morro National Monument, in New Mexico, the inscriptions have been coated with waterproof paint.

Pollywogs

The pollywog in youth can swish
About the pool, a long-tailed fish;
He browses on the sunken weed,
He lives the life all fishes lead,
And makes, we have no sort of doubt,
Fast friends of eels and bass and trout.
And then another life begins—
He sheds his tail, discards his fins,
No longer is a pollywog
But a land-going, green-skinned frog,
By nature most adroitly planned
To live in water or on land.
Our sort of life is not so good.
We never change from babyhood,
Except to grow a bit each day
And by and by get bald or gray.
We have no rare experience
With two quite different elements;
Nor think with recollection fond
Of when we swam about the pond.
Yet, notwithstanding, I'm afraid,
We'll have to stay as we were made.

—James J. Montague in
New York Herald-Tribune.

Buffalo, N. Y., is to have a new museum of science.

The Egyptians built large wooden sea-going ships 2,000 years before Christ.

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GENERAL SCIENCE

Scientific Method

Quotation from SCIENCE, RELIGION AND REALITY. By Arthur S. Eddington. New York. Macmillan. Dr. Eddington is professor of astronomy at Cambridge University, England.

The learned physicist and the man in the street were standing together on the threshold about to enter a room.

The man in the street moved forward without trouble, planted his foot on a solid unyielding plank at rest before him, and entered.

The physicist was faced with an intricate problem. To make any movement he must shove against the atmosphere, which presses with a force of fourteen pounds on every square inch of his body. He must land on a plank travelling at twenty miles a second round the sun—a fraction of a second earlier or later the plank would be miles away from the chosen spot. He must do this whilst hanging from a round planet head outward into space, and with a wind of ether blowing at no one knows how many miles a second through every interstice of his body. He reflects too that the plank is not what it appears to be—a continuous support for his weight. The plank is mostly emptiness; very sparsely scattered in that emptiness are myriads of electric charges dashing about at great speeds but occupying at any moment less than a billionth part of the volume which the plank seems to fill continuously. It is like stepping on a swarm of flies. Will he not slip through? No, if he makes the venture, he falls for an instant till an electron hits him and gives a boost up again; he falls again, and is knocked upwards by another electron; and so on. The net result is that he neither slips through the swarm nor is bombarded up to the ceiling, but is kept about steady in this shuttlecock fashion. Or rather, it is not certain but highly probable that he remains steady; and if, unfortunately, he should sink through the floor or hit the ceiling, the occurrence would not be a violation of the laws of nature but a rare coincidence.

Science News-Letter, November 20, 1926

The Weather Bureau is furnishing special weather reports at 17 places for the benefit of fliers along commercial airways.

The pilchard, a very oily fish which abounds off the coast of British Columbia, is being used as a source of oil for paint, soap, medicine and margarine.

ENTOMOLOGY

Ants As Architects

Quotation from THE NATURAL HISTORY OF ANTS. By Rene Antoine Ferchault de Reaumur, translated with an Introduction and Notes by William Morton Wheeler, New York: Alfred A. Knopf.

Ants of all species are more to be admired for the ardor with which they toil than for the artistry of their constructions. The architecture of every formicary is extremely simple and crude. After reading the descriptions made by the ancients of the interior of the several kinds of habitations, one might be prepared to find them divided up like some of our large buildings. They distinguish among them several apartments set aside for different purposes. According to these authors, the first and most spacious is the lodging of the ant population; the second is, so to speak, the apartment of the women, the gynnæceum, where the females abide with their small families. They have placed the granaries at the portals of this noble apartment. Finally, some have placed the cemetery immediately next to the granaries. The only truth in all this diversity, in which nearly everything about the granaries and the cemetery is to be rejected, is that usually most of the ants are found nearer the top of the formicary than are the young insects which constitute their ardent hopes and which are not yet ants. And we should be forming a wrong idea to imagine large squares like those of our cities, or anything like halls, immense in comparison with the whole edifice, for the general assemblage of the ants. If, in order to form a juster conception, we compare the formicaries with cities proportional to the stature and number of the citizens, it would be with cities composed only of arcaded streets; or if we be content to compare the formicaries with a single edifice built for the accommodation of a great number of tenants, they may be said to be composed throughout of intersecting stairways, while the most roomy spaces of each formicary are very small and comparable with the landings of the stairways. It is therefore in the streets, which are really covered over, and on the stairways and their landings, that the ants abide, now higher and now lower, according to the conditions of the atmosphere.

Science News-Letter, November 20, 1926

Macaws were favorite pets of Indians in the southwest.

Metal alloys can be made that resist temperatures as high as 2550 degrees Fahrenheit.

First Glances at New Books

ELEMENTS OF ASTRONOMY, by Edward A. Fath, New York. McGraw-Hill Book Company. $3.00.

At last teachers of astronomy have a text-book suitable for elementary classes that includes the most important of recent discoveries and theories such as Hubble's determination of the distances of some of the spiral nebulae and Eddington's ideas of the source of radiation of the stars. The clear descriptions and lack of mathematics which make it so excellent a text also commend it to the general reader.

WHAT PRICE PROGRESS? The stake of the investor in the discoveries of science. By Hugh Farrell. New York. G. P. Putnam's Sons. $2.50.

Practical and interesting talks to business men on the value of research to industry. Full of concrete and up-to-date examples from American manufactures, plainly and pertinently put.

MODERN SCIENCE AND PEOPLE'S HEALTH. Edited by Benjamin C. Gruenberg. New York. W. W. Norton & Co. $2.50.

Chapters by Prof. Stockard of Cornell Medical College, Prof. Taylor of Princeton, Prof. Eddy of Columbia, Dr. White of St. Elizabeth's Hospital, Prof. Winslow of Yale, Dr. Emerson of Columbia, exposing medical fakes, explaining heredity, describing hormones, giving laws of nutrition, telling how the brain works, discussing the prevention of sickness and pointing the possibilities of public health work.

THE SMALL FRUITS OF NEW YORK, by U. P. Hedrick, Albany. New York State Agricultural Experiment Station. $7.50.

A quarto volume of over 600 pages, with scores of sumptuous colored plates, describing and figuring all named varieties of small fruits of a great horticultural area. It is remarkable that such a monumental work could have been produced at so low a price.

OUR MOBILE EARTH. By Reginald A. Daly, New York. Charles Scribner's Sons. 1926. $5.00.

An up-to-date and popularly written discussion of earthquakes, volcanoes and such manifestations of the earth's unsettled character, and their causes.

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Anniversaries of Science

November 28, 1520.—Magellan completed his passage through the Strait of Magellan and sailed into the Pacific Ocean, which he named.

Facing northward to escape the cold, the explorers encountered such favorable weather that the difficulties and privations they had passed through were well-nigh forgotten. The sudden, violent tempests had given place to steady winds which wafted them on their course over the surface of a placid sea, and thankful for their deliverance from their troubles they gave the name of the Pacific to the vast ocean which had afforded them so friendly a reception. "Well was it named the Pacific," Pigafetta writes, "for during this time (three months and twenty days) we met with no storm."

—Guillemard: *Life of Ferdinand Magellan.*

November 29, 1831.—Michael Faraday wrote to a friend that he had completed his researches on electromagnetic induction. The work done at this time on "electric machines" has directly resulted in the modern dynamo.

No fact is better known to philosophers than the power of the voltaic current to deflect the magnetic needle, and to make magnets according to *certain laws;* and no effect can be more distinctive of an electrical current.

—Faraday: *Experimental Researches in Electricity.*

November 30, 1703.—Isaac Newton elected President of the Royal Society.

Newton's honors were now gathering thick around him. On the 30th November, 1703, he was elected, on the retirement of Lord Somers, President of the Royal Society; and he was annually re-elected during the remaining twenty-five years of his life, having held the office for a longer time than any of his predecessors, and longer too than any of his successors, excepting Sir Joseph Banks.

—Brewster: *Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton.*

November 30, 1878.—Crookes sent a paper to the Royal Society with the title: "On the Illumination of Lines of Molecular Pressure and the Trajectory of Molecules."

Crookes' "dark space" of "Molecular disturbance" is, according to modern views, a space filled with negative corpuscles (electrons) projected from the cathode under the influence of electrostatic force. Their velocity increases in their flight along the lines of electric force, and finally their speed suffices to "ionize" or split up the remaining gas molecules into particles or "ions" carrying positive and negative charges respectively. This ionization is attended with the luminosity which limits the dark space. At extreme vacua, the electrons hit the glass walls of the tube, and their impact produces a green or blue fluorescent patch which emits X-rays.

—D'Albe: *Life of Sir William Crookes.*

ENTOMOLOGY

U. S. Wages Insect War

By L. O. Howard

Dr. Howard as chief of the Bureau of Entomology of the U. S. Department of Agriculture is in charge of this nation's offensive against its insect enemies.

The great war which is constantly being fought, not by nation against nation nor race against race, but by man against his eternal enemies the insects, is widening in its scope, is getting more threatening in its aspects. The outlook is dark but not hopeless. It necessitates, however, the widest dissemination of information on conditions and whole-hearted support of research to place mankind in a position to meet the emergency.

The attack of the insects is being made in several directions. It is directly upon our health; upon our food supply, and upon our pocketbooks. Working quietly but incessantly the insects yearly devour $2,000,000 worth of food, nullify the labor of a million men, and spread disease to many of our kind.

Government funds and the energies of trained men are being expended against these dangerous pests. On the cotton boll weevil, the gypsy moth, the European corn borer and the Japanese beetle—four of the farmer's worst enemies—nearly half of the government's appropriation of $2,500,000 was spent last year. The results have been telling but the insects have only been retarded in their spread. They have not been wiped out. Aeroplane dusting with arsenate of lime has been effective in the case of the boll weevil; spraying and other methods have helped to hold back the Japanese beetle, and the introduction of the natural enemies of the corn borer, gypsy moth and Japanese beetle, has been of assistance in fighting them.

At least three of the great agricultural machinery manufacturing firms have promised to put on the market this fall devices which will aid in the fight against the corn borer. These devices will cut the corn stalks close to the ground. This procedure is advocated by the Bureau of Entomology because the larva of the corn borer lives for some months in the lower part of the corn stalk. The difficulty is in getting the farmers to change their former methods of farm practice. They are scarcely more ready to take up a new method of cropping than were the cotton growers to use an early maturing seed, force the crop, and destroy the stalks in the fields, the cropping

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method recommended by the Bureau of Entomology years ago.

The necessity for the cooperation of all farmers in better farm practices cannot be over-emphasized. Only by such cooperation can the country hope to curb the onslaught of the rising tide of insects. Through the energies of the quarantine service of the Federal Horticultural Board the dangers of foreign pests have been lessened. But many of these foreign pests are already in the country and there is constant danger from domestic species. Numerous native pests are now under government study and every year brings forth some new danger from an unexpected source. Almost every cultivated crop has some close relatives among the wild plants and no one knows just when some insect that infests the wild plants may turn its attention to some related cultivated plant.

The situation with respect to disease-carrying insects is somewhat different. People will always take more precautions where their lives are endangered than where their property is affected. The campaign against the house-fly and disease-bearing mosquitoes was quickly taken up and the public has cooperated more readily, perhaps, in protecting itself against them than have the farmers against the crop pests. The danger from disease-carrying insects will probably be no greater in the future than it is at present. There is a crying need for a research laboratory for the investigation of the fundamental things in entomology. We should know the fundamental facts in insect life—their vital processes, physiology, and every aspect of their life through all its phases. There are probably five million species of insects of which only about six hundred thousand have been described.

Memory Rime

The Descent of Man

First came poor Pithecanthropus, who
ranged the jungle raw,
And then the man of Heidelberg, who
left naught but a jaw,
Him followed soon the Piltdown man
—a strange, aberrant race,
And likely, too, Rhodesian man comes
somewhere in this place.
Then came the Type Neanderthal—
of fire they knew the use,
And last, the noble Cro-Magnon, the
first to woo the Muse.

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